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## NOTES AND EXTRACTS.

### EXPERIMENTAL AGRICULTURE AT METEOROLOGICAL STATIONS.

According to the Experiment Station Record, Vol. XIII, No. 8, page 708, the system of agricultural meteorological stations in Russia is especially worthy of commendation. In 1897 the Russian Department of Agriculture and Imperial Domain established a system of stations for the purpose of bringing observations on meteorology and agricultural phenomena into closer relationship, with a view to determining more definitely the effect of various meteorological conditions on crop production:

Each meteorological station has connected with it a series of plats, not exceeding 1 dectaine (2.7 acres) each in area, on which various crops are grown. Adjacent to the plats are arranged the meteorological apparatus for measuring the temperature and humidity of the air, intensity of the sunlight, direction and velocity of the wind, etc. On the plats are installed a rain gage, thermometers for determining the temperature of the soil at the surface and at different depths, and likewise apparatus for determining the humidity of the soil and measuring the snowfall. Phenological observations are made systematically on the crops under cultivation, and a record is kept of the different stages in the development of the plant, of all the work done on the plats, any injuries caused by meteorological or other factors, and the final yields of grain and straw. In addition to these observations some stations study the underground waters, the intensity of the sun's energy, the relations of the atmospheric conditions to cultivation of the soil, and similar matters.

The stations differ in their equipment; those of the second class have only the more common apparatus, and their studies are therefore of a more limited character.

The agricultural meteorological stations are for the most part connected with the experiment stations, experimental fields, and agricultural schools, although some are located on private estates. In addition to the stations there are a large number of "observation plats," which are provided with simpler meteorological apparatus, some having, also, apparatus for the determination of soil moisture.

Early in 1901, when the official report was prepared, there were 65 of these agricultural-meteorological stations, 21 of which were of the first class and 44 of the second class, and 113 observation plats, 90 of which were provided with apparatus for studying soil moisture in addition to the atmospheric conditions. The meteorological bureau, in addition to its work in agricultural meteorology, is elaborating plans for weather forecasting, although little has been done in that direction as yet.

The list of publications of the Meteorological Bureau of the Russian Department of Agriculture includes papers on the practical importance of agricultural meteorology, instructions for making the simplest agricultural-meteorological observations, an article on the relation of the cereal crop to sun spots and meteorological factors, and a review of the observations of the agricultural-meteorological stations of central Russia, together with a number of more popular publications on the relation of meteorological conditions to crop production.

This is evidently the most extensive and systematic series of institu-

tions for the study of agricultural meteorology that has been inaugurated by any country, and its work will be followed with much interest. If nothing more is done than to work out satisfactory methods and a basis for correlating the meteorological and soil conditions with the production of staple crops, the results will be of widespread importance, and will pave the way for similar studies by the experiment stations in various countries.

### MOUNTAIN STATIONS FOR METEOROLOGY.

The observatory on the summit of Ben Nevis and the corresponding low-level observatory at Fort William were established in 1883 at a time when the importance of obtaining systematic records of what is called the free atmosphere, at a considerable elevation above sea level was felt as one of the most pressing needs of meteorology. Since those days the employment of the kite and the sounding balloon has enabled us to attain still greater elevations than were considered possible at that time. But these two great improvements must always be very much restricted in their application to meteorology, they can not give us continuous records. The latter are still needed and will in fact continue to be necessary for generations to come, and their records can only be properly interpreted and utilized when combined with the occasional records that are obtained by the use of the kite and balloon and by the study of the upper clouds.

Meteorology considered as a system of research into the laws of the motions of the atmosphere is not a matter that can be prosecuted successfully by any short-lived spasmodic or discontinuous system of work, it must be undertaken by permanent cooperation and the long-continued labors of all nations; the important mountain observatories should especially be maintained intact from generation to generation without any thought of discontinuing their work. Each pair of high and low stations is really of more importance to meteorology than any dozen stations at sea level. The time will doubtless come when Mount Washington, Pikes Peak, and numerous other high stations in this country will be permanently occupied. The reports from both of these stations were frequently of great use to the Editor in his early forecast work, and it is only a question of time when we shall learn how to make use of them on every occasion. Meanwhile we quote the following remarks by Sir Arthur Mitchell, Honorary Secretary of the Scottish Meteorological Society with reference to the Ben Nevis Observatory:

In the work of the two Ben Nevis observatories, the directors did all